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Notes on the Michigan species of Polygonatum*

Oliver Atkins Farwell

(WITH PLATES 12–18)

Much difficulty has been experienced, during the past few years, in trying satisfactorily to place all our forms of *Polygonatum*, known as Solomon's Seal, within the prescribed limits of the two species accredited in our manuals to North America. There are a number of characters which seem to be common to all. The stem is finely many-striate, cylindrical and smooth when green but channelled more or less deeply when dry; the leaves of all are glaucous beneath and have minutely pubescent or papillose margins, the papillae of which range from 85 μ in *P. cuneatum* to 7 μ in *P. biflorum;* they are indefinitely nerved, the smallest having not less than fifty-five nerves, which can be definitely distinguished by the unaided eye; and they are never acute but end in a short, narrow or broad, very obtuse or rounded apex; the peduncles are compressed, channelled on one side, and arching; the pedicels, at least at the flowering season, are bracteate near their junction with the peduncle; the perianth-lobes are deltoid, dark green, and barbellate within; the filaments are partly adnate, partly free; the anthers are sagittate; the fruits are black with a bluish bloom, as in many species of *Vaccinium*, and if collected before maturity appear, in the dried specimens, to be indehiscent, but at full maturity they are dehiscent, rupturing with the slightest pressure; the bony, whitish or greenish white seeds are turgid, subreniform, and smooth. The forms can be definitely separated into

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two groups based upon pubescence of foliage or lack of it, size of flowers, and form of filaments, the two groups corresponding to the two species usually recognized. But it is next to impossible to include under one species forms with yellow flowers and those with green; forms that are constantly seven or eight feet in height with those that never exceed one or two feet; forms that have elongated very narrow leaves with those that have very short and broad ones; forms with slender flexuous peduncles with those having coarse, rigidly wiry ones. Differences in size alone are not characters upon which to base new forms of plants but when correlated with other constant differences there is pretty good evidence for their recognition. An effort to place these forms led to an investigation of the publications of earlier botanists with some surprising and unexpected results.

It seems that neither Linnaeus, Miller, the elder Aiton, Murray, nor any of their contemporaries had recognized any American species of this group of plants nor even included American plants in the European species with which they dealt. Walter was the first to describe an American species, the *Convallaria biflora*, a glabrous plant with three-nerved leaves, which has since had a rather varied career. Bosc came next, describing *C. hirta*, a species with hispid peduncles and stems, otherwise glabrous. Michaux and Persoon referred the American species to the European *C. multiflora*. Wildenow followed with two new species, *C. pubescens* and *C. canaliculata*. Besides recognizing the above species under *Polygonatum*, now considered distinct from *Convallaria*, Pursh, suppressing Walter's specific name *biflora* and substituting for it his own name *angustifolium*, admitted *P. latifolium*, a European species, to a place in our flora. Poiret came next with *Convallaria parviflora*. The two Schultes described *C. commutata* and, in 1835, Dietrich added still another, *P. giganteum*. Thus in the first half century after the first American species had been described eight others were recognized by the earlier students of the American flora, seven being considered endemic and the other two identical with European species. It would thus seem that the botanists of a century ago had a more accurate conception of the genus in America than those of the present day. More than seventy years later Dr. Greene described three other species, *P. virginicum*, *P. boreale*, and *P. cuneatum*, bringing the total number of species described for America up to twelve; but these, like most of the others, have not been generally accepted as valid. Dr. Hooker, in 1840, united the nine species then known and placed them all under *P. multiflorum* as var. *americanum*. Dr. Torrey followed the lead of Hooker and went even further by uniting them all under *P. multiflorum*, not even giving them varietal rank. In the first edition of the Manual, Asa Gray recognized *P. pubescens* Pursh and *P. canaliculatum* Pursh. In the second edition, the former becomes *P. biflorum* Ell., the latter, *P. giganteum* Dietr., and a third species, *P. latifolium* Desf., is admitted. In later editions *P. commutatum* supersedes *P. giganteum* and *P. latifolium* is eliminated.

As stated above, Walter was the first to describe an American species under *Convallaria*, and his description is as follows:

biflora 2. foliis semiamplexicaulibus trinervis laevibus, oblongis, acutis, altnernis; caule tereti laevi; pedunculis solitariis bifloris axillar, floribus flavescentibus.

Willdenow's descriptions, in part, of *C. pubescens* and of *C. canaliculata* are as follows:

Convallaria *pubescens*

Convallaria foliis alternis amplexicaulibus ovatis subtus pubescentibus, caule teretiusculo sulco exarto, pedunculis axillaribus subbifloris. . . .

Folia alterna ovata secunda basi leviter amplexicaulia integerrima nervosa, nervis 7 majoribus, supra saturate viridia glabra, subtus albicantia et ad nervos pilis albis obsita. Pedunculi uni- vel biflori secundi nutantes axillares. Corolla . . . albido-flavescens . . . .

Convallaria canaliculata foliis alternis amplexicaulibus oblongis margine pubescentibus, caule canaliculato, pedunculis bifloris axillaribus.

Differt a *Convallaria pubescenti:* foliis oblongis glabris margine tantum tenuissime pubescentibus, coralla magnitudine et facie Convallariae Polygonati. Hanc sub nomine *Convallariae multiflorae* in Flora boreali-Americana indicavit Michaux p. 202.

A very careful study of these descriptions never should have permitted any confusion as to the application of the names; if there are but two species in North America, then the proper names for them are *Polygonatum pubescens* (Willd.) Pursh, for the plant with pubescent leaves, and *P. biflorum* Walt., for the plant with glabrous leaves. Willdenow's plate illustrating the former (see PLATE 12) is excellent and is exactly matched by plants in Michigan. Both *C. biflora* and *C. canaliculata* are described as having oblong leaves and two-flowered peduncles; in the former the flowers are described as *yellow* and in the latter as of *the size and appearance of those of C. Polygonatum*, which are *green* and about seven lines in length; the leaves in the former are said to be three-nerved but Willdenow makes no mention of this feature; Kunth, however, in his description of Willdenow's plant says the leaves are ovate-oblong, about three inches long by sixteen or seventeen lines in width and striately many-nerved. The two cannot therefore be of the same species. Pursh described *P. angustifolium* with elliptical-lanceolate leaves; Elliott described *P. biflorum* Walt. likewise; in other respects these descriptions are essentially the same as that of Walter's *C. biflora*, each quoting the latter as a synonym. But an oblong leaf that is acute may be essentially the same as a leaf that is elliptical-lanceolate, and these three names and descriptions may, therefore, be considered as synonymous, Elliott restoring Walter's specific name, which had been suppressed by Pursh for one of his own coining.

It seems scarcely possible by the widest stretch of the imagination to include, under the above description of Walter, the pubescent-leaved plants with small greenish or greenish white flowers, yet that is not only what Gray and subsequent authors have done but they have finally come to make the latter form the principal element of the species to which Walter's name has been applied or rather misapplied. The confusion of these species was started by Dr. Hooker, continued by Dr. Torrey, and finally completed by Dr. Gray, when he ultimately and inexcusably transferred the name of Walter from the species described by that author to an entirely different one and not of very close relationship. And this interpretation has been blindly followed by subsequent authors for nearly half a century.

The Michigan species naturally fall into two groups—one containing low, slender plants having pubescent chartaceous foliage and small flowers with slender filaments; and the other containing robust plants having glabrous, membranaceous leaves and large flowers with large, stout filaments. Both are to be placed under Baker's section ALTERNIFOLIA. The first group may be known as the *Pubescentes* and the second, as the *Glabrata*. Under the *Pubescentes* three species have been described, *P. pubescens*, *P. cuneatum*, and *P. boreale*. In all these forms the filaments are papillate. Dr. Greene describes the peduncles of *P. boreale* as filiform and flexuous; this can scarcely be said of the specimens that have come under the author's observation, except as to the two or three uppermost, the others being too stout, compressed, and channelled to be called filiform; otherwise the specimens agree with Dr. Greene's descriptions. There is another form with the perianth pale green throughout or with the lobes just noticeably of a darker green than the tube.

In the *Glabrata* seven species have been described, *P. biflorum*, *P. hirtum*, *P. canaliculatum*, *P. parviflorum*, *P. commutatum* (all originally as species of *Convallaria*), *P. giganteum*, and *P. virginicum;* two others have been referred to the European *P. latifolium* and *P. multiflorum*, making nine in all. These species will fall into two series, one with yellowish white flowers and relatively narrow leaves and the other with greenish flowers and relatively broad leaves. Several forms can readily be recognized; also one form with ancipital stems has been found, i. e., in cross-section the outline is elliptical. *P. commutatum* and *P. giganteum* are but varying forms of *P. canaliculatum* and may better be considered as varieties of it. *P. virginicum* appears to be a broad-leaved form of *P. biflorum*. In Michigan another form is found which is analogous to *P. canaliculatum* but the flowers are yellowish. In this group it would be natural to look for *P. parviflorum* Dietr. (*Convallaria parviflora* Poir.). Such descriptions (not the original) of this species which the author has seen point unmistakably to some species of the *Glabrata* notwithstanding it is said to have flowers of the size of those of the *Pubescentes*. Probably the description was drawn from an immature dried plant and the flowers had not yet opened at the time of collection. Oftentimes the pressure exerted in course of pressing will burst open the buds so that they appear to be matured flowers in the dried specimens. *P. hirtum*, a species with glabrous leaves, but with the upper part of the stem and the peduncles hispidly pubescent, would also be sought here but nothing answering to the description of either has been found in Michigan. No intermediate forms have come under the author's observation, i. e., none of the large-leaved, large-flowered forms has had pubescent leaves or small flowers nor none of the small-leaved, small-flowered forms has had glabrous leaves or large flowers. There appears to be no intergradation between the *Pubescentes* and the *Glabrata;* Walter's *P. biflorum* is typical of the latter and Pursh's *P. pubescens*, of the former.

Key to the species

Leaves pubescent on the veins underneath; flowers 6–10 mm. in length; filaments filiform, papillate; plants up to 4.5 dm. in height (*Pubescentes*).	
Flowers with a yellowish white tube.	
Leaves ovate.	*P. pubescens.*
Leaves elliptical, cuneate.	*P. pubescens cuneatum.*
Flowers green, leaves elliptical.	
Leaves large, flowers dark green.	*P. boreale.*
Leaves small, flowers light green.	*P. boreale australe.*
Leaves glabrous; flowers 12–25 mm. in length, filaments more or less flattened; plants taller and stouter, 6–24 dm. in height (*Glabrata*).	
Flowers yellowish, free part of filament smooth, longer than the anthers.	
Stems cylindrical.	
Leaves cuneate-lanceolate.	*P. biflorum.*
Leaves ovate- to oblong-elliptical, flowers 12–14 mm. long.	*P. biflorum virginicum.*
Leaves ovate to lance-ovate, flowers 16–18 mm. long.	*P. biflorum ovatum.*
Stems ancipital.	*P. ellipticum.*
Flowers green, filaments granular, or papillate, free part shorter than the anthers.	
Peduncles two-flowered.	
Leaves lance-ovate, flowers 14 mm. long.	*P. canaliculatum.*
Peduncles two- to eight-flowered.	
Leaves ovate, flowers 12 mm. long.	*P. canaliculatum americanum.*
Leaves roundish ovate, flowers 14 mm. long.	*P. canaliculatum giganteum.*

POLYGONATUM PUBESCENS (Willd.) Pursh, Fl. Am. Sept. 234. 1814

Convallaria pubescens Willd. Hort. Berol. 45. *pl. 45.* 1816.
P. multiflorum β americanum (in part) Hook. Flor. Bor. Amer. 2: 176. 1840.
P. biflorum Ell. in A. Gray, Manual, Ed 2, 466, 1856, mostly and of subsequent authors. Not Walter in Elliott, Bot. S. C. & Ga. 1: 393. 1817.
Salomonia biflora Farwell, Rep. Com. Parks Detroit 11: 53. 1900.

Stems glabrous, up to 4.5 dm. high, 2–4 mm. in diameter, leafless part the longer; leaves nine to thirteen, ovate to lance-ovate, 17–33 mm. wide by 5–7.5 cm. long, amplexicaul, subsessile, or short-petioled, green above, pubescent on the nerves below; three to seven of the nerves more or less prominent; peduncles short, about 12 mm. long, one- or two-flowered; pedicels shorter than the peduncle; flowers 8–10 mm. long by 2–3 mm. wide, occasionally sessile, cylindrical, tube yellowish white or white in dry specimens; the free part of the filament filiform, papillate, and shorter than the anthers; mature fruit globular, 8–10 mm. in diameter; seeds three to nine, 4 mm. wide. [PLATES 12, 13, A.]

Generally in rather dry woods and copses of oak and maple. MICHIGAN: Keweenaw Peninsula, June, 1886, *Farwell 380;* Rochester, May, 1914, *Farwell 3624.* MASSACHUSETTS: Russell, May, 1873, *H. H. Rusby* (distributed as *P. biflorum*). NEW JERSEY: Franklin, August, 1879, *H. H. Rusby* (likewise distributed as *P. biflorum*).

Polygonatum pubescens cuneatum (Greene) comb. nov.

P. cuneatum Greene, Leaflets 1: 181. 1906.

Differs from the species only in having longer and relatively narrower leaves, cuneate at the base (18–35 mm. wide by 6–12 cm. long). [PLATE 13, B.]

MICHIGAN: near Marquette, *Greene ;* Detroit, May, 1895, *Farwell 380c;* Keweenaw Peninsula, October, 1914, *Farwell 3909.*

POLYGONATUM BOREALE Greene, Leaflets 1: 181. 1906

Leaves larger, elliptical, 33–45 mm. wide by 7.5–10 cm. long, generally sessile; flowers green, darker than the foliage, otherwise as in *P. pubescens.* [PLATE 14, A.]

Copses of oak and maple. MINNESOTA: Winona, *Greene.*

MICHIGAN: Keweenaw Peninsula, June, 1886, *Farwell 380a;* Ypsilanti, May, 1891, *Farwell 380b.*

Polygonatum boreale australe var. nov.

Leaves small (10–22 mm. wide by 2.5–5 cm. in length), elliptical or the lower inclined to ovate-elliptical; peduncles filiform, compressed only below the arch, one-flowered, flowers water-green (Ridgway's nomenclature), paler than the foliage. [PLATE 14, B.]

Sparsely wooded fields. MICHIGAN: Detroit, May, 1895, *Farwell 380d.*

POLYGONATUM BIFLORUM Walt. in Elliott, Bot. S. C. & Ga. **1**: 393. 1817

Convallaria biflora Walt. Fl. Car. 122. 1788.

Polygonatum angustifolium Pursh, Fl. Am. Sept. 234. 1814.

Polygonatum multiflorum β americanum (in part) Hook. Flor Bor. Am. **2**: 176. 1840.

Whole plant glabrous, with nine to thirteen, secund elliptical-lanceolate leaves (18 mm. wide by 10–12.5 cm. long), rounded or somewhat cuneately narrowed to a sessile base, and with three to five more or less prominent nerves; peduncles slender, about 12 mm. long, two-flowered; flowers yellow; stems about 4.5 dm. high and 2–3 mm. in diameter. [PLATE 15, A.]

Atlantic seaboard, not typically represented in Michigan.

Polygonatum biflorum virginicum (Greene) var. nov.

Polygonatum virginicum Greene, Leaflets **1**: 181. 1906.

Salomonia commutata (in part) Farwell, Rep. Com. Parks Detroit **11**: 53. 1900.

Differing from the typical form of the species in its larger, ovate-elliptical to oblong-elliptical leaves, which are 25–55 mm. wide by 10–18 cm. long, with fifteen to twenty-three of the nerves more or less prominent; in its larger stems, 6–8 mm. in diameter, 6–9 dm. high, with the naked lower portion equal to or longer than the upper leafy part; in its larger flowers which are funnel-shaped to linear-cylindric (4–6 mm. wide by 14–25 mm. long, even on the same plant), borne on longer (often three-flowered) peduncles (25–37 mm. in length), with subequal pedicels 6–10 mm. in length; fruit ovoid to globular, 12–16 mm. in diameter; seeds eight to ten. [PLATE 15, B.]

Moist grounds in woods or in shady places. VIRGINIA: *Greene*. MICHIGAN: Belle Isle, Detroit River, June, 1893, *Farwell 1150b;* Parkdale Farm, June, 1914, *Farwell 3676, 3677, 3682, 3683*. The most developed form of the species.

Polygonatum biflorum ovatum var. nov.

Salomonia commutata (in part) Farwell, Rep. Com. Parks Detroit 11: 53. 1900.

Differs from the above in having smaller ovate to elliptical leaves (18–37 mm. wide by 7.5–10 cm. long), with fewer conspicuous nerves (seven to nine) and short stems (4–6 mm. in diameter and 4.5–6 dm. in length), often with a foliaceous, sheathing bract 10–12 cm. below the first leaf, and generally smaller flowers (4–8 mm. wide by 14–18 mm. long). [PLATE 16, A.]

Open, rather dry woods and fields. MICHIGAN: Belle Isle, Detroit River, June, 1893, *Farwell 1150a;* near Rochester, June, 1914, *Farwell 3674, 3678, 3679*.

Polygonatum ellipticum sp. nov.

Whole plant glabrous; stems about 9 dm. in height, the naked lower portion (3.5 dm.) *shorter than the leafy part (5.2 dm.) and ancipital, the cross-section being elliptical in outline (6 × 10 mm.)*, whence the specific name; leaves about twenty, ovate-lanceolate (25–37 mm. wide by 7.5–10 cm. long), five to nine more or less prominent nerves, semi-amplexicaul, sessile; peduncles slender, up to 60 mm. in length with very unequal pedicels up to 25 mm. from four-flowered in the lower to one-flowered in the uppermost; flowers yellowish white, 16–20 mm. long by 4–5 mm. wide. [PLATE 16, B.]

Dry fields and pastures. MICHIGAN: Rochester, June, 1914, *Farwell 3673*.

POLYGONATUM CANALICULATUM (Muhl.) Pursh, Fl. Amer. Sept. 234. 1814; Kunth, Enumeration **5**: 134. 1850

Convallaria canaliculata Muhl. in Willd. Hort. Berol. 45. 1816.

Polygonatum multiflorum β americanum (in part) Hook. Fl. Bor. Am. **2**: 176. 1840.

Whole plant glabrous; stems cylindrical, 6–10 mm. in diameter, about 10 dm. high, equally divided between the naked lower portion and the upper leafy part; leaves about fourteen, ovate to elliptical, 30–55 mm. wide by 10–14 cm., with nine to thirty-one more or less conspicuous nerves, semi-amplexicaul, subsessile or sessile; peduncles up to 30 mm. in length, with equal pedicels 12 mm. or less, two-flowered; flowers green, broadly tubular, 12–14 mm. long by 4–6 mm. wide. [PLATE 17, A.]

Moist elder thickets. MICHIGAN: Rochester, June, 1914, *Farwell 3677½*.

Polygonatum canaliculatum americanum (Hook.) comb. nov.

Polygonatum latifolium Desf. in Pursh, Flor. Amer. Sept. 235. 1814.

Convallaria commutata J. A. & J. H. Scult. Syst. **7**: 1671. 1830.

Polygonatum commutatum Dietr. in Otto & Dietr. Gartenz. **3**: 223. 1835.

Polygonatum multiflorum β americanum (in part) Hook. Fl. Bor. Amer. **2**: 176. 1840.

Polygonatum latifolium var. *commutatum* Baker, Jour. Linn. Soc. Bot. **14**: 555. 1875.

Polygonatum biflorum commutatum Morong, Mem. Torrey Club **5**: 115. 1894.

Stems 9–12 dm. in height, cylindrical, about 10 mm. in diameter, only the lower third naked; leaves eighteen to twenty-eight, ovate-lanceolate, 25–60 mm. wide by 7.5–14 cm., with nine to thirty-one more or less conspicuous nerves, peduncles often 5 cm. in length with subequal pedicels, 18 mm. or less, two- to eight-flowered (generally six- or seven-flowered on the lower peduncles); flowers 14 mm. long by 4 mm. wide. [PLATE 17, B.]

Low wet situations in open fields and thin woods. MICHIGAN: Ypsilanti, June, 1893, *Farwell 1150;* near Rochester, June, 1914, *Farwell 3675*. NEW JERSEY: Franklin, August, 1875, *H. H. Rusby* (distributed as *P. giganteum*). ONTARIO: Walkerville, June, 1891, *A. L. Johnson* (likewise distributed as *P. giganteum*).

Polygonatum canaliculatum giganteum (Dietr.) comb. nov.

Convallaria multiflora L. in Michx. Fl. Bor. Amer. **1**: 202. 1803.

Polygonatum multiflorum Desf. in Pursh, Fl. Amer. Sept. 234. 1814.

Polygonatum giganteum Dietr. in Otto & Dietr. Gartenz. **3**: 222. 1835.

Polygonatum multiflorum β americanum (in part) Hook. Fl. Bor. Am. **2**: 176. 1840.

Polygonatum biflorum γ giganteum Wood, Bot. & Flo. 346. 1870.

Stems 20 dm. or more in height, 18 mm. in diameter near the base, the lower naked portion about 9 dm. high; upper portion carrying about twenty-eight sessile or subsessile leaves, which are round-ovate or oval (30–37 mm. wide by 60–90 mm. long), with about fifty-three more or less conspicuous nerves; peduncles flat, 2 mm. wide by 90 mm. in length, rigid; pedicels 25 mm. or less, subequal; flowers usually four (two to five), 14–16 mm. long by 4–6 mm. wide; fruit 20 mm. in diameter ripening fifteen seeds, 5 mm. wide. [PLATE 18.]

Moist elder thickets. MICHIGAN: Rochester, June, 1914, *Farwell 3473*. The hyaline subulate bracts of the pedicels, which in the other species are small (2 mm. long) and early deciduous, are in this variety large (4–8 mm. long) and persistent, at least in some cases.

The author wishes to thank Miss Mary A. Day, of the Gray Herbarium, most heartily for transcripts of the original descriptions of Walter and Willdenow and for a sketch of Willdenow's plate of *C. pubescens* which is herewith reproduced for comparison; for a like purpose a photograph of the narrow-leaved plant (*P. biflorum*) collected by Dr. Rusby is also reproduced.

DEPARTMENT OF BOTANY,
PARKE, DAVIS & COMPANY,
DETROIT, MICHIGAN

Explanation of plates 12-18

PLATE 12

Polygonatum pubescens (Willd.) Pursh. From photograph of Willdenow's plate 45 in Hort. Berol.

PLATE 13

A. *Polygonatum pubescens* (Willd.) Pursh. Photographs of specimens from Keweenaw Peninsula, *Farwell 380*, and from near Rochester, *Farwell 3624*, Michigan. B. *Polygonatum pubescens cuneatum* (Greene) Farwell. Photographs of specimens from near Detroit, *Farwell 380c*, and from the Keweenaw Peninsula, *Farwell, 3909*, Michigan.

PLATE 14

A. *Polygonatum boreale* Greene. Photographs of specimens from Keweenaw Pensinula, *Farwell 380a*, and from near Ypsilanti, *Farwell 380b*, Michigan. B. *Polygonatum boreale australe* Farwell. Photograph of specimens from near Detroit, Michigan, *Farwell 480d.*

PLATE 15

A. *Polygonatum biflorum* Walt. Photograph of a specimen from Franklin, New Jersey, *H. H. Rusby.* B. *Polygonatum biflorum virginicum* (Greene) Farwell. Photograph of specimens from Parkedale Farm, Michigan, *Farwell 3682.*

PLATE 16

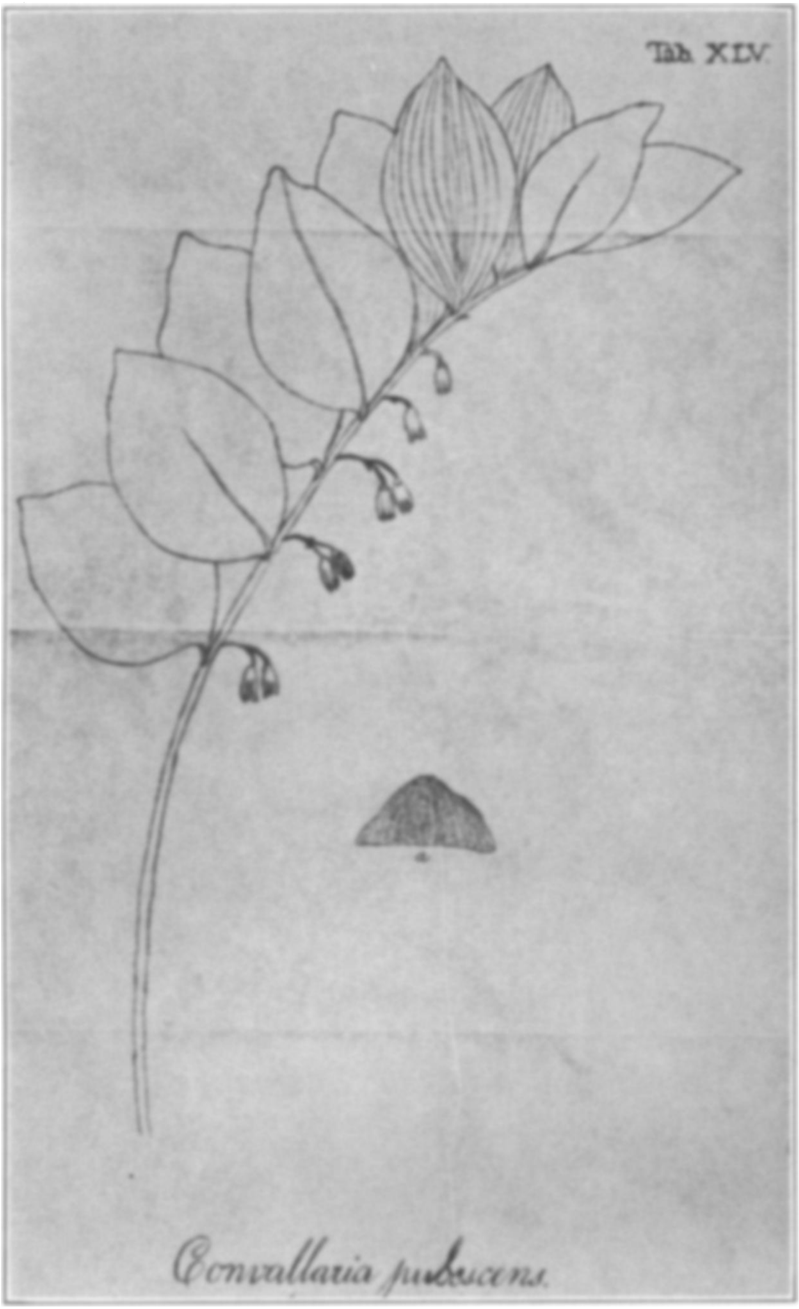
A. *Polygonatum biflorum ovatum* Farwell. Photograph of specimens from near Rochester, Michigan, *Farwell 3674.* B. *Polygonatum ellipticum* Farwell. Photograph of specimens from near Rochester, Michigan, *Farwell 3673.*

PLATE 17

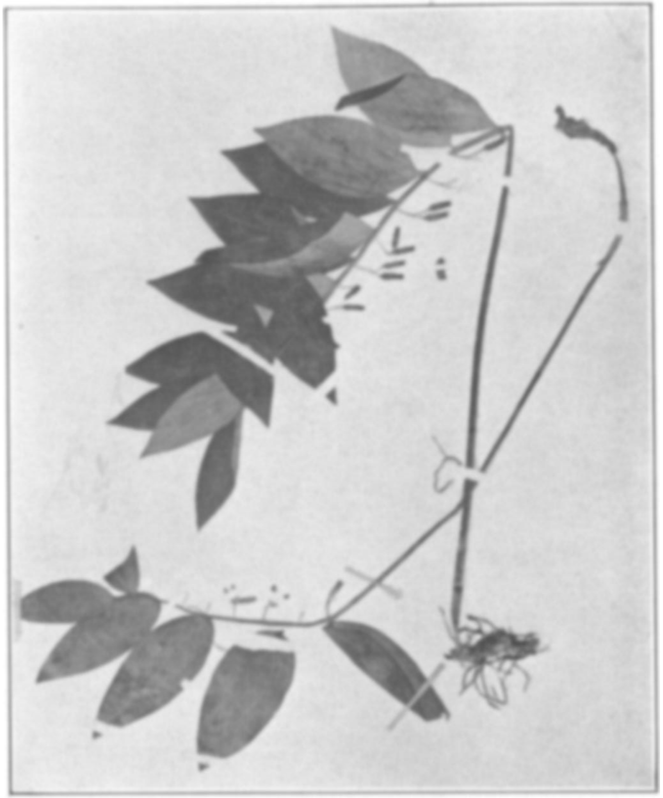
A. *Polygonatum canaliculatum* (Willd.) Pursh. Photograph of specimens from Parkedale Farm, Michigan, *Farwell 3677 1/2.* B. *Polygonatum canaliculatum americanum* (Hook.) Farwell. Photograph of specimens from near Rochester, Michigan, *Farwell 3675.*

PLATE 18

Polygonatum canaliculatum giganteum (Dietr.) Farwell. Photographs of specimens from Parkedale Farm, Michigan, *Farwell 3473.*



POLYGONATUM PUBESCENS (WILLD.) PURSH



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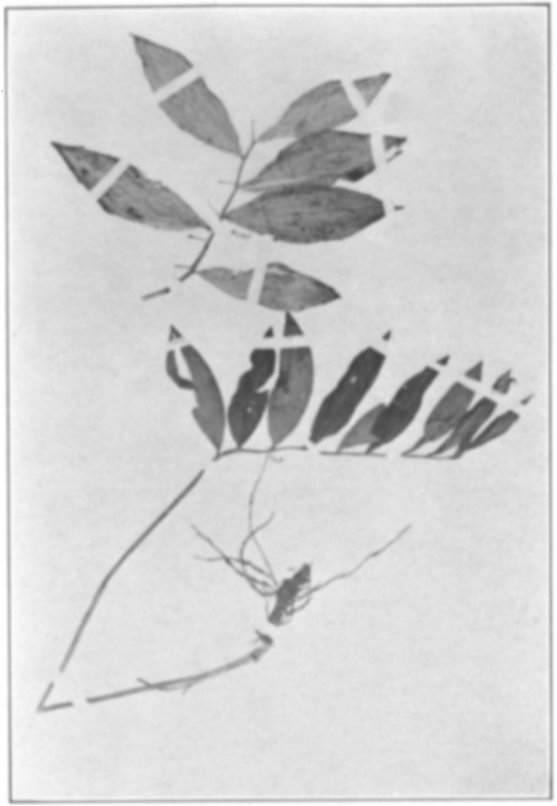
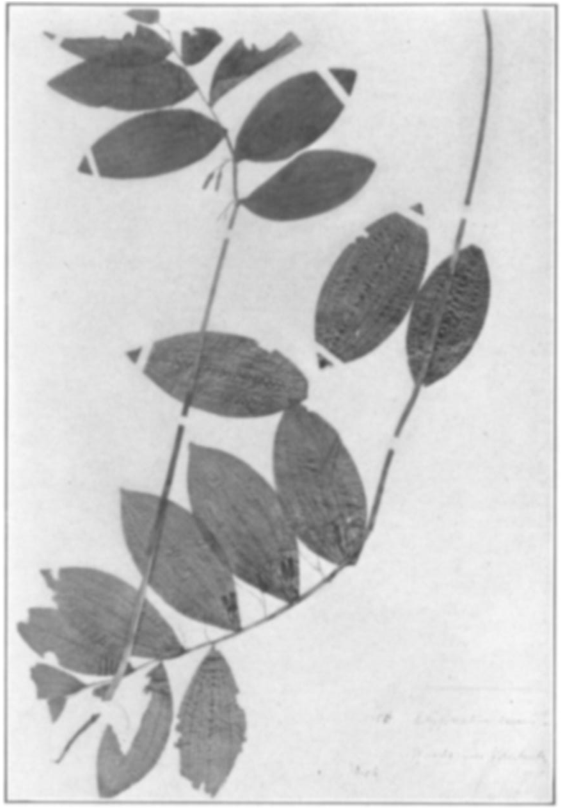
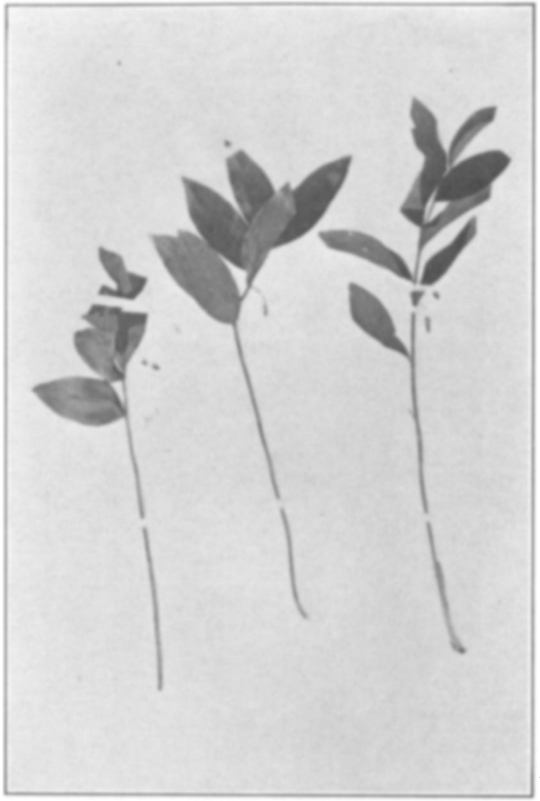


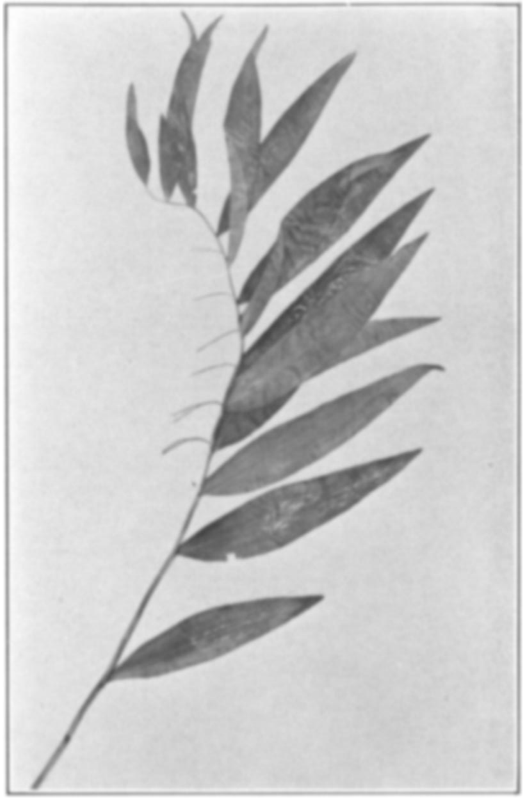
B. POLYGONATUM PUBESCENS CUNEATUM (GREENE) FARWELL



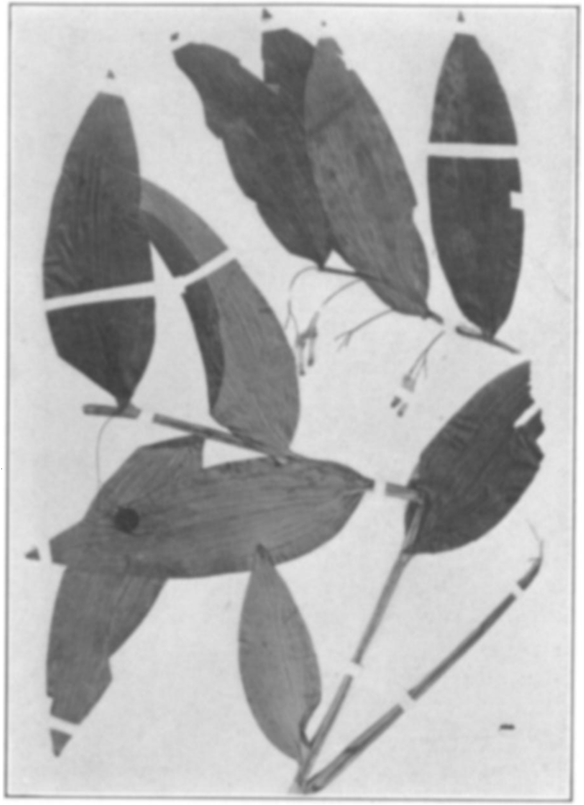
A. POLYGONATUM BOREALE GREENE



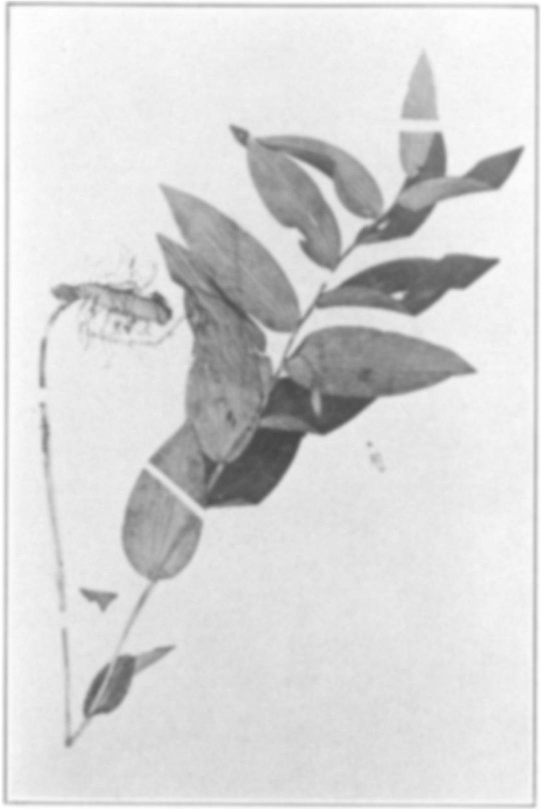
B. POLYGONATUM BOREALE AUSTRALE FARWELL



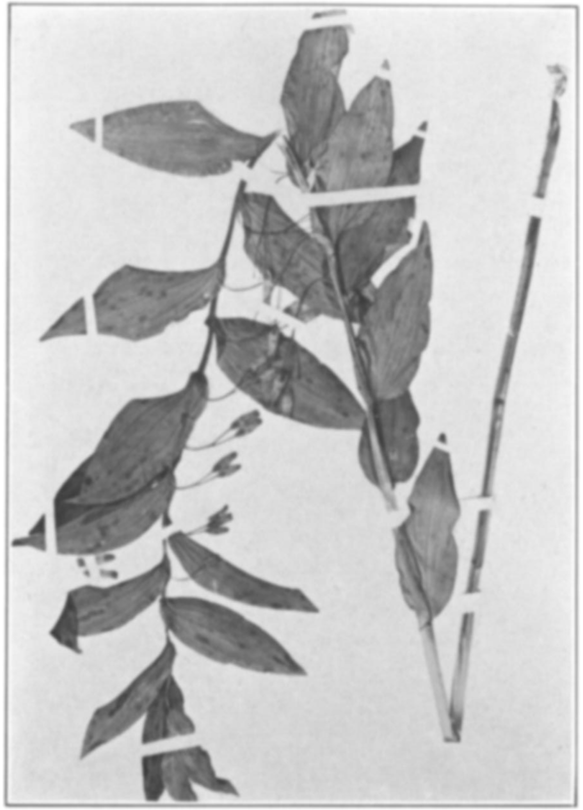
A. POLYGONATUM BIFLORUM WALT.



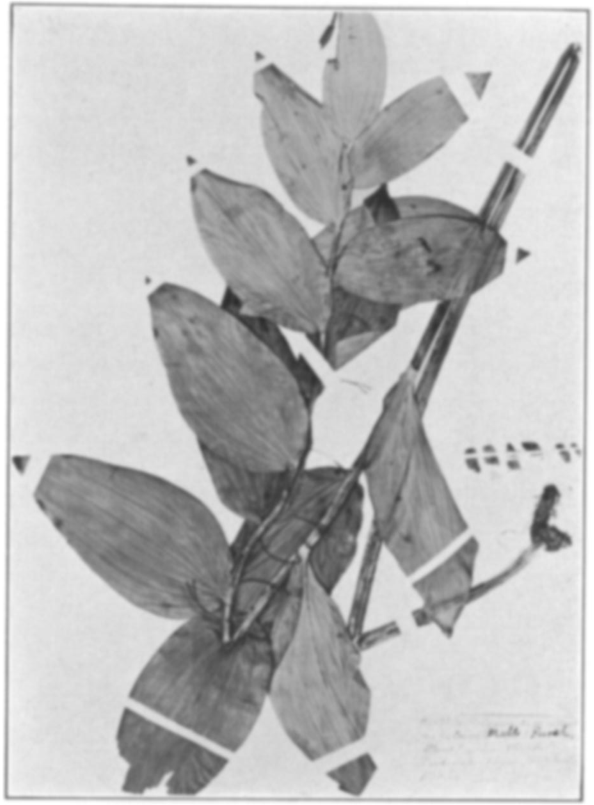
B. POLYGONATUM BIFLORUM VIRGINICUM (GREENE) FARWELL



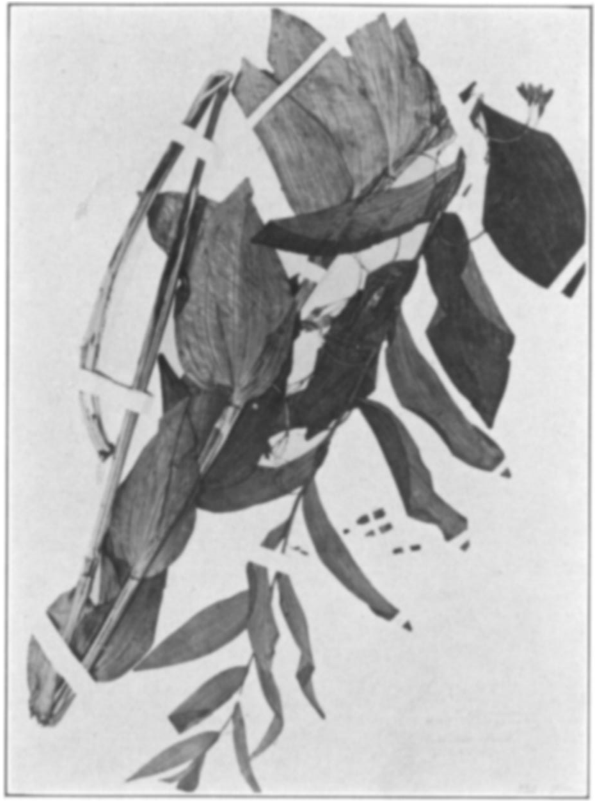
A. POLYGONATUM BIFLORUM OVATUM FARWELL



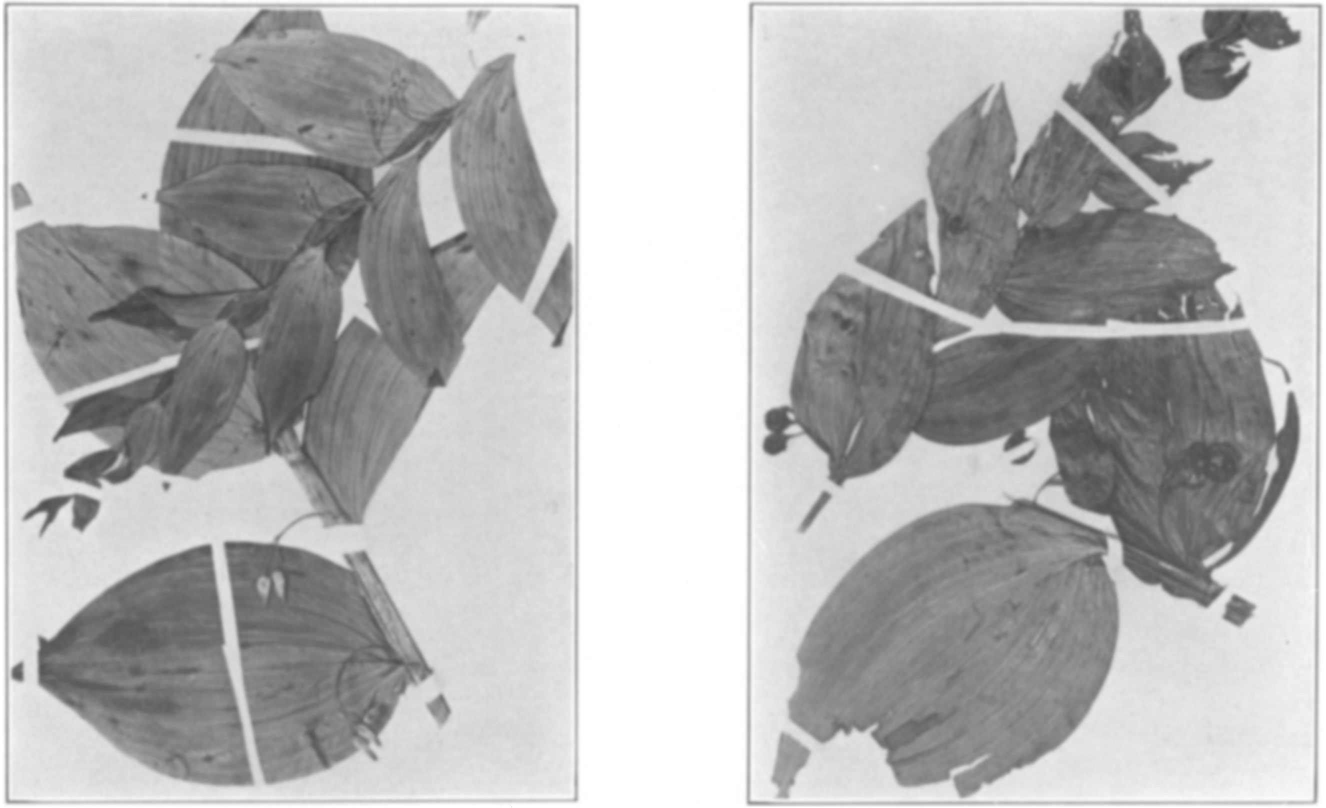
B. POLYGONATUM ELLIPTICUM FARWELL



A. POLYGONATUM CANALICULATUM (MUHL.) PURSH



B. POLYGONATUM CANALICULATUM AMERICANUM (HOOK.) FARWELL



POLYGONATUM CANALICULATUM GIGANTEUM (Dietr.) Farwell